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Intergovernmental Cooperation for Mission-Oriented Information Systems: A Memoir

John E. Woolston

Abstract

This frankly personal account is based on my involvement in negotiations, design, and development for international bibliographic systems to support three different missions: fostering the peaceful uses of atomic energy (International Nuclear Information System, or INIS); supporting research, development, and better practices in agriculture (International Information System for the Agricultural Sciences and Technology, or AGRIS); and improving economic and social conditions in poorer countries (Development Sciences Information System, or DEVSIS). All three designs were based on the concept of decentralized operation: each country reports the information produced in its own territory; the merging of this input and the overall management are in the hands of an organization in the United Nations system; and all participants have equal rights to exploit the entire database. INIS began in 1970 and is still in steady operation; AGRIS started in 1975 and showed quantitative and qualitative growth for more than twenty years but has been in disastrous decline since its peak in 1996; and DEVSIS, unfortunately, was not launched on a global scale. Attempts are made to identify the conditions—political and technical—likely to favor or frustrate efforts to obtain cooperation among countries for the construction of large, essentially comprehensive databases and ultimately for sharing knowledge without discrimination between rich and poor participants.

Science and technology were immensely important in the prosecution of World War II. The armed forces were supported by other government agencies, universities, and industrial contractors, and in varying degrees they all became engaged in research, development, and implementation. Their efforts needed direction and coordination, and the importance of information management and delivery became self-evident. Information programs were set up within government agencies and maintained, after demonstrating their utility, with progressive enhancements and sophistication into the 1950s and 1960s.

Similar developments occurred in several countries, but we particularly remember those in the United States: the Department of Defense, the Atomic Energy Commission (AEC), the National Aeronautics and Space Administration, and the Department of Commerce. Such activities were the subject of a landmark review (President's Science Advisory Committee, 1963), which was released from the White House with a foreword signed by President John Kennedy. The document is usually known as the "Weinberg Report" because Alvin M. Weinberg chaired the group that conducted the review and made the recommendations.

This report provides a good starting point for the developments described in this paper. For example, with a clarity that is typical of the entire text, the report explains the distinction between "discipline-oriented" and "mission-oriented" information systems. Systems defined by academic disciplines already had a long history and—then as now—were usually the responsibility of the professional organizations serving those disciplines (for example, *Chemical Abstracts*, a product of the American Chemical Society). Typically, the editors sought to impose high standards, admitting only those publications whose scientific rigor and novelty had been assured by peer reviews. International cooperation among the main discipline-oriented systems was managed either bilaterally or through the Abstracting Board of the International Council of Scientific Unions. However, cooperation did not succeed in overcoming the language

barrier. Thus, for a given discipline much the same content would likely be found in several independent systems based on different national languages (particularly English, French, German, and Russian).

In general, the mission-oriented systems had a much shorter history. They were largely based in the United States and had grown out of the wartime experience. At the time of the Weinberg Report the best known was probably *Nuclear Science Abstracts* (*NSA*), which was produced by the AEC from its offices in Oak Ridge, Tennessee, and was dedicated to the mission of facilitating the peaceful uses of atomic energy (Shannon, 1970; Vaden, 1992). The main characteristics distinguishing mission-oriented from discipline-oriented systems are well illustrated by *NSA* and may be summarized as follows:

- ***Multidisciplinary material:*** The admission of information to a mission-oriented system was determined solely by its relevance to the mission. Thus *NSA* contained material drawn from many disciplines: physics, chemistry, biology, most branches of engineering, and some branches of medicine.
- ***More flexibility in standards:*** If a document contained information that had the potential to advance the mission, it would be admitted to the system without great regard to editorial standards or whether it had passed a peer review. Relevant journal articles were, of course, included along with many mimeographed technical reports issued by the institutions where the work had been done.
- ***Rapidity:*** Information made available quickly is more likely to be useful than information that has been delayed. So the managers of mission-oriented systems have always sought to minimize the time lapse between the receipt of a document and its announcement by the system. If necessary, this speed would be achieved at some sacrifice to the quality of presentation, and of course the emphasis on speedy turnaround was a great incentive to the mission-oriented systems to become pioneers in the use of computers.
- ***Full-text delivery:*** In the main, discipline-oriented systems announce materials (journals and books) that are distributed commercially and are to be found in major libraries. Those systems can then focus on abstracting and indexing without worrying about the availability of the full texts. Not so for the mission-oriented systems: it would serve little purpose to announce a technical report if its full text had been produced in only a few copies and if it was almost impossible to acquire. Mission-oriented systems were therefore driven to set up reprographic services and to employ developing technologies, such as microcards and then microfiches.

The mission-oriented systems had one huge advantage. Since they were identified as serving programs of national significance, such systems operated as components of government agencies and were able to make appropriate claims on big budgets. In the 1950s and 1960s U.S. government salaries were quite attractive, and, for example, high-school science teachers in Tennessee were happy to take positions with the AEC as abstractors and indexers for *NSA*. Endowed with skilled staff and access to other important resources, it is no wonder that the mission-oriented systems were able—particularly in the United States—to blaze a trail for the computer-based information systems of the future.

Credit must also be given to individuals, especially those who had the responsibility to maintain production and deliver an ever-growing volume of output. Often they were beset by enthusiastic promoters of new technologies that, while offering prospects for faster processing and reduced costs, would jeopardize the entire operation if they failed. Robert L. Shannon managed the production of *NSA* in Oak Ridge, Tennessee. I was told he had been a submarine commander in World War II; he certainly knew how to run a tight ship.

When *NSA* first started in 1948, most of the available literature was in the form of technical reports, most of which were from the United States. But if *NSA* was to fulfill its mission, it needed to grow and to take in all types of literature from all parts of the world. It quickly moved to include the journal articles, and the AEC began to establish exchanges with nuclear programs in other countries. These arrangements were consistent with President Dwight Eisenhower's "Atoms for Peace" initiative, which led to more exchanges, under which the AEC also provided subscriptions to *NSA* itself. The development of *NSA* was further accelerated by the series of United Nations Conferences on the Peaceful Uses of Atomic Energy. At the first of these conferences, held in Geneva in 1955, the world watched as countries followed each other in releasing vast amounts of information that had previously been held secret. More was released at the second conference in 1958, and these actions of "declassification" led to the production of many new books—even many new journals—which *NSA* was quick to notice and to bring within the compass of its abstracting service.

As we entered the 1960s, *NSA* had become the indispensable tool for libraries serving nuclear scientists and technologists throughout the world. And it was to remain so until 1976; W. M. Vaden (1992) records that by 1968 *NSA* was being fed by exchange agreements with 316 institutions in 44 foreign countries (p. 215). But as *NSA* evolved and grew, its complexity and cost had increased more or less in proportion to the quantity of literature available. In the 1960s the director of the AEC's technical information program was Edward J. Brunenkant, who had his office and a component of his staff in Washington, D.C. Brunenkant realized he would probably not be able to secure sufficient resources to continue the development and expansion of *NSA* into the future; so he began to search for a mechanism to involve other countries in the effort that would be required. Such countries as the U.S.S.R., France, and the United Kingdom had personnel already skilled in the tasks of nuclear documentation, and the Euratom organization (one of the forerunners of the European Union) had started an ambitious program that would use computers and innovative techniques for information retrieval. Brunenkant believed that it was time to bring these efforts into a unified global program and thus avoid the duplication that would result if they became consolidated as separate and independent operations.

Of course, if one wants others to share the work and the costs, one must be ready to yield proportionate shares in management and decision making. Brunenkant accepted this, but he sometimes seemed to doubt whether he could bring all his staff (and his masters) to accept it too.

Any global cooperative program would certainly need to be under the aegis of the International Atomic Energy Agency (IAEA), which after years of political haggling had been endowed in 1956 with a statute empowering it to "foster the exchange of scientific and technical information" (Fischer, 1997, pp. 35–36). These were the years of the cold war: the Soviet Union was likely to be suspicious of any initiative coming from the United States, and it was unlikely even to begin talks in any forum other than that of the IAEA.

The IAEA, headquartered in Vienna, had begun its work in 1957, and it had immediately established a Division of Scientific and Technical Information (STI). A "panel" was set up to advise on the work of this division; it met annually and was initially composed of one person from each of the countries identified as the "Big Five" on the IAEA's board of governors (Canada, France, the United Kingdom, the United States, and the U.S.S.R.). The panel helped the STI director to construct a program and budget that would be accepted by the agency's member states, and it enabled the "western" members to develop their cooperation with each other. However, the Soviet member would usually remain aloof from the discussions, especially from anything at all speculative about future directions. And the head of the division's "Documentation Section" (in those years always a Soviet citizen) would insist on a very traditional approach to his work. So in the early 1960s, even if Brunenkant had been ready to offer a bold new program to succeed *NSA*, the panel would probably not have been capable of negotiating the details and reaching an agreement.

The third U.N. Conference on the Peaceful Uses of Atomic Energy took place in 1964, and Brunenkant invited many of the information specialists who had been in Geneva to come to a meeting the next week in Stresa, Italy. There he and his staff challenged the others to consider the prospect that the AEC would not be able to continue *NSA* in its current form and to think about options for the future. It was not clear whether, or to what extent, the AEC representatives had formulated specific plans in their own minds, but they must have been disappointed by their failure to elicit a coherent response.

Brunenkant made one more try, this time with the IAEA's panel. He asked for a special meeting and was represented by John Sherrod, his assistant director for systems development, who talked enthusiastically about new advances in computer technology and his belief that they would have enormous implications for bibliographic control of world literature. In view of what was subsequently designed and implemented, it seems strange now to admit that the other members of the panel were quite unable to envisage a system, both international and computerized, and how it would function.

Meanwhile, however, and perhaps reacting to the fear that the AEC would be unable to continue full coverage of the world's literature, several countries began to contribute descriptive cataloging and abstracts for incorporation in *NSA*. And recognizing a trend toward keyword indexing in other agencies of the U.S. government, the AEC began negotiations with Euratom to secure cooperation in the indexing of the world's nuclear literature and the maintenance of an appropriate thesaurus. Thus seeds were planted for a program that at the global level still lacked a clear definition.

International Nuclear Information System (INIS)

If further progress was to be made, the discussion needed to be promoted to another level and, in view of cold war antagonisms, to a level where foreign-policy and diplomatic concerns could be taken into account. Brunenkant talked with the State Department. Somehow it was agreed that in the summer of 1966 the IAEA would invite two consultants, one Soviet and one American, to meet in Vienna and to stay long enough to explore all options and determine whether a program could be defined that was acceptable to both parties. The U.S.S.R. named Lev L. Issaev from its State Committee for the Utilization of Atomic Energy, and the United States named Raymond K. Wakerling, who was responsible for technical information at the Lawrence Radiation Laboratory and had had considerable experience working with the AEC's program. Both were in direct communication with their diplomatic missions in Vienna, as well as with technical experts. They began to use the name "INIS," and they recommended that the IAEA, in consultation with its member states, try to establish a system to which all of them could adhere. Each country would be invited to prepare bibliographic input for the documents produced in its own national territory.

It became clear from behind-the-scenes discussions that the consultants were describing something that governments could see as a "win-win" situation. Brunenkant's vision of a single global program would be realized, and the Soviet Union had conceded that English would be the "carrier language" for information to be processed by computer; the Soviet Union for its part would get a new window on western computer technologies; and by cooperating on such a sensitive topic as atomic energy, the United States and the U.S.S.R. could give themselves and the rest of the world a glimmer of hope for a break in the cold war.

At this point in the narrative let me explain how I came to be involved in the events described in this paper. From 1953 I had been head of "technical information" in Canada's main nuclear research center at Chalk River, Ontario: as such I had been present at the three U.N. conferences in Geneva, had participated in all the meetings of the IAEA's STI panel, and had been a guest at several sessions of the AEC's Technical Information Panel, as well as its meeting in Stresa. Now I was about to take on a more direct responsibility, and although I was yet to take up the position, I had been selected to be the next director of IAEA's STI division. So in December 1966, when the Agency convened a working group (sixteen countries, three international organizations) to maintain the momentum of the Issaev-Wakerling recommendations, I was appointed to chair the sessions devoted to the drafting and adoption of the meeting's final report.

The meeting was extraordinary. It was held in the IAEA's impressive conference hall, where the participants—all essentially information specialists—sat in the semicircle of front-row seats that had been designed for the IAEA's governors. However, behind each (or most) of the participants was at least one other person, an official stationed in Vienna and representing that participant's own national government. These "advisers" were sitting there because their governments saw the meeting as a significant political event—and they were very anxious that it should succeed. Given a chance that the United States and the U.S.S.R. would agree to cooperate, the rest of the world wanted to make sure that no obstacle would be put in the way—indeed, that the "technical experts" would not be allowed to endanger the result by quarreling over trivialities, such as rules for bibliographic descriptions or the choice of techniques for retrieving information by subject!

This meeting gave support to the concept that, in general, each country should take responsibility for reporting the documents produced within its own geographic territory and that these various "inputs" should be merged to create master files. But most participants were thinking of *NSA* as the standard against which any alternative should be judged. They were skeptical about the IAEA's ability to meet this standard, and many of them would have been content to see INIS as a means for giving international status to *NSA* and enhancing its coverage of the whole world's relevant literature.

Much of the discussion focused on the question of whether participating countries should provide abstracts. Having already agreed that English would be the language for material processed by computer, the Soviet Union was understandably reluctant to take on the huge job of translating abstracts for all its own material. At one point it seemed that the United States and the U.S.S.R. were about to agree that INIS could begin simply as an announcement service giving references without abstracts. A very respected participant eloquently protested. I noticed, however, that his intervention was followed by a whispered but animated conversation with his adviser. He asked for the floor again, and when I was able to

recognize him, he withdrew everything he had said in his first statement. Looking back, I think this was the moment when we, the information specialists, all realized that the die had been cast: there was going to be something called "INIS," and the IAEA would be responsible for its management and probably also for its operation. Now it was up to us to cooperate and to make compromises so that the product would be as useful as possible.

I started work at the IAEA in April 1967. The political support was immensely important to the process of getting INIS designed and brought into operation (Woolston, 1969; Woolston, Issaev, Ivanov, & Del Bigio, 1970). Nevertheless, there was no single "boss" to make decisions. Everything still had to be decided by consensus. So we convened working parties on different aspects of the design, and we recruited consultants with impeccable technical qualifications. There were plenty of arguments, especially by those who foresaw the prospect of having to change their current practices. But we had a deadline for each component of the design, and decisions were reached, even if grudgingly on the part of some of the participants.

Brunenkant once told me that during his years at the AEC he had spent many hours listening to librarians and documentalists argue about the relative merits of different rules for bibliographic description. He had long since concluded that any of the variants would be workable and that what really mattered was that everyone should adopt the same rules so that data could be exchanged or merged without reworking. Fortunately, this philosophy ultimately prevailed as each of our deadlines approached.

One potential stumbling block was the issue of obtaining a "thesaurus." Since INIS would use keyword indexing, we needed a structured list of eligible terms. Just such a product had been developed by Euratom in Luxembourg, and it was far more fully researched than anything we could produce in the time available. Euratom was an intergovernment organization—one forerunner of the present European Union—and the member states of Euratom were all member states of the IAEA. But Euratom itself had no formal status with the IAEA, and in the political climate of the day the Soviet Union would have obstructed any attempt to give it such status. However, Euratom was justifiably proud of its achievement and was not about to let us use the thesaurus without some recognition for its work.

The person in charge of information at Euratom was Rudolf Brée, a German whom I had first met many years before in Canada. We began to talk and in the process got to know and trust each other. We were determined to find a solution and avoid a political storm. So too was my immediate superior at the IAEA, Ivan Zheludev of the U.S.S.R. In the end we were able to convince our organizations to accept a rather simple process: the IAEA would give a "commercial" contract to Euratom to develop and deliver an "INIS thesaurus" along with a manual and software, and Euratom would host an IAEA staff member to participate in the work and to act as liaison with the INIS team in Vienna.

The STI division was responsible for providing computer service for the entire IAEA, and although there were plenty of other applications, many of them growing, it was the arrival of INIS that was going to require a major upgrade in our hardware. I should not have worried: the IAEA's governors approved the purchase of a mainframe computer costing about a million dollars, a significant sum in the 1960s, especially for a bibliographic system! Nor should I have worried about the development of the necessary software. Our staff included a young Italian systems analyst, Giampaolo Del Bigio, who inspired and led the programming effort; his basic concepts can still be traced in INIS as it exists today and in many of the other systems that followed.

We often blame politics for delaying or aborting good ideas or programs. In the case of INIS, however, it was undoubtedly the political forces that made a good thing possible. The first regular product was issued in May 1970 (and I returned to Canada a month later). In 1976, after the content of the printed output, *INIS Atomindex,* had become largely the same as that of *NSA,* the U.S. authorities discontinued their own publication. Thus a highly respected mission-oriented system under centralized national management was succeeded by a decentralized cooperative system under international management. For those involved, this was a momentous occasion, and testimonials to the twenty-seven-year record of *NSA* have been summarized by Vaden (1992, pp. 303–306). There was particular justice in the fact that the same Edward Brunenkant who had so assiduously promoted the international option was serving as director of IAEA's STI division when the transfer was consummated.

Since then INIS has had no significant actual or potential competitor. The system has remained in regular operation, and the database now contains records of 2.3 million documents. Along the road new technologies have been adopted to ease the preparation and

collection of decentralized input, to permit access to the database on CD-ROM and over the Internet, and to digitize the huge volume of material contained in a half-million full-text documents. The IAEA has also developed what seems to be an effective mechanism for the governance of INIS. All participating countries name their "INIS liaison officers," who meet usually once a year. Since these individuals represent the sources of input—the very lifeblood of the system—the IAEA respects their views and seeks to meet their requirements as far as possible.

Agriculture, Forestry and Fisheries—AGRIS

The story of the development and start-up of AGRIS should be told by Raymond Aubrac. However, the life of this remarkable Frenchman has been so full of drama and high adventure that, when he came to write his autobiography, his editors would not allow him to devote more than a few pages to "documentation," a subject that they, not he, deemed relatively dull (Aubrac, 1996, pp. 341–352). His involvement began in 1964 when, as a civil engineer, he came to Rome and to the U.N.'s Food and Agricultural Organization (FAO) looking for information he needed for the design of irrigation works in Morocco. He met the FAO's director general, Dr. B. R. Sen, and they talked about the waste and duplication that occur when useful knowledge, recorded in technical reports and produced at great expense, is not put within the reach of the people who could use it. Aubrac can be convincing, and he was eventually assigned a wide range of responsibilities at the FAO, including the direction of its information, library, and documentation activities. He succeeded in setting up a computerized system to make the FAO's own technical reports more readily available (at that time a matter of some several thousand new reports per year plus a huge backlog), and he became passionate about the need to establish national documentation services in newly independent developing countries (Menou, 2004). This task involved providing the necessary resources and training and ensuring the repatriation of information generated in the former colonies but retained by the colonial powers in their metropolitan institutions. Long after Aubrac retired from the FAO, he was still putting his voluntary effort into the establishment and operation of such services.

Aubrac records that on 6 December 1968 he visited the U.S. National Agricultural Library (NAL) and met its director, John Sherrod. Sherrod was new in this job, having recently transferred from his position in Brunenkant's program at the AEC. Just as he and Brunenkant had worried about how to maintain production of *NSA* and continue comprehensive coverage of the world's nuclear literature, so Sherrod was now confronted with a similar problem in maintaining NAL's *Bibliography of Agriculture*. Here too the quantity of literature was increasing remorselessly and from a much larger base. Virtually every country in the world was publishing in agriculture and of course in many different languages (Sherrod, 1984).

Sherrod told Aubrac about INIS, which was still in its design phase at the IAEA. He described the "territorial" formula, under which each country would be responsible for reporting its own publications and documents, and how the IAEA would merge these reports into a global database freely available to all participants. Aubrac was fascinated and eagerly began to explore the possibilities of adopting a similar model for an FAO-based mission-oriented information system in support of the agricultural sector. He set up an informal working party, and seeking advice from many sources, he invited me to go from Vienna to Rome early in 1970 to give an account of the INIS experience to members of his staff.

The concept of a decentralized, cooperative information system has many attractions. A centralized system needs a big budget to acquire the literature from around the world and to employ specialists to select, index, and abstract the individual items. These costs must be recovered, and the products typically are sold at prices that developing countries cannot afford. Conversely, the decentralized, cooperative system requires a relatively small budget for its coordinating office, and each country, in constructing an inventory of its nationally produced information, is doing a job it probably wants to do anyway. It employs its own nationals at its own salary levels, and having contributed its national records to the cooperative system, it receives in return the contributions of all the other participating countries.

The name AGRIS was adopted for the proposed new information system, but everyone immediately realized that constructing it would be much more difficult than constructing INIS. For the nuclear mission there had only been *NSA* at the world level, and the proprietors of *NSA* were ready to abandon it once INIS was fully established. But the agricultural sector was already endowed with many significant information services. Thus there were vested interests that could be expected to see AGRIS as a challenge.

The FAO set up a "Panel of Experts on AGRIS" under the chairmanship of Sir Thomas Scrivenor, the

executive head of the Commonwealth Agricultural Bureaux (CAB), a group of institutes that were producing a series of abstract journals in key areas of agricultural science. Most of the other members of the panel were also drawn from existing services. One was John Sherrod, who was prepared to yield NAL's *Bibliography of Agriculture,* just as Brunenkant had been ready to yield the AEC's *NSA*. But I think it is fair to say that, other than Sherrod, most members were looking for more rather than less business for their own organizations.

At its first meeting in July 1970 the panel came up with a concept that over the years proved quite divisive. It proposed that AGRIS be constructed on two levels: level one would be a comprehensive current-awareness service in all fields of the FAO's responsibility (thus essentially equivalent to NAL's *Bibliography of Agriculture* plus forestry and fisheries); level two would be "a network of specialized services which may include specialized information centres, analysis centres and data banks, with responsibility in depth for particular subject fields" (East, 1971, p. 2). From the start it was evident that level two was envisaged, among other things, as a mechanism to provide international recognition and support to the CAB institutes in the United Kingdom and to similar bodies in other European countries.

At a second meeting in January 1971 the panel recommended that the FAO should set up an AGRIS study team to report later in the year. Harry East from the British organization ASLIB was recruited as its coordinator. Many individuals and organizations were invited to contribute to the study and its report (East, 1971). Especially now, rereading the report with hindsight, it seems to involve an elaborate exercise to define a role for the services at level two. National participants would be asked to identify new literature and report it at level one. Would they not also be able to contribute abstracts? Why reserve abstracts for a second tier of services? The study team danced around this issue, but no one was yet ready to tackle it.

With a go-ahead from the panel at its third meeting the FAO embarked on the design and construction of AGRIS, still with its two levels. Over the next five years the development efforts were led by Gérard Dubois, a Belgian staff member who was the FAO's chief for bibliographic systems, along with Harry East, who had now joined the FAO team.

In this narrative I shall attempt to disentangle the two levels. Work on level one proceeded constructively, and so it became the AGRIS that was operated, largely successfully, for the last quarter of the twentieth century. Despite setting up working parties, recruiting consultants, and welcoming experts outposted from their countries, the FAO was unable to develop level two into a concrete program. Unfortunately, this failure embittered some of the original promoters of AGRIS, who then withheld their support from the more successful part of the program.

Let me explain how I became involved in the AGRIS development. Returning to Canada from Vienna in 1970, I joined an entirely new organization, the International Development Research Centre (IDRC), established and funded by the government of Canada. Acting essentially in the tradition of benevolent foundations, the IDRC was to use its funds to support research in developing countries on issues related to the betterment of their economic and social conditions. The president, David Hopper, was setting up programs in agriculture, health, and social sciences, but he was very conscious that scientists in developing countries were usually at a great disadvantage with respect to library and information service. He invited me to develop a parallel program in information sciences. After consulting my new colleagues, I quickly came to conclusion that, if AGRIS were to be set up, it could become the cornerstone of a program to enhance information service for agricultural scientists in developing countries.

Because of my experience with INIS I was full of optimism. International cooperative systems would make vast stores of information available to the whole world without discrimination. The work of building the databases would be shared by the "territorial" formula, which represented an equitable distribution of costs. Each country would have the same right of access to the outputs, irrespective of economic status. This would be of immense benefit, particularly for scientists in developing countries who could not afford to subscribe to existing services, especially when payments had to be in hard currencies. Further, by becoming participants, developing countries would acquire new skills in recording information and also in exploiting it. I saw all this as totally consistent with the objectives of the IDRC; so I contacted Aubrac and offered to help in the building of AGRIS and in ensuring access to it for the developing countries.

Aubrac responded positively. He too was anxious that AGRIS should become a tool to help make agricultural information as readily available in poor countries as in rich countries. But it was going to be an uphill struggle. When the FAO director general had set up the Panel of Experts in April 1970, he had named nine

persons: one was from the United States and the rest were from Western Europe. I was added to the membership, but it was to be another three or four years before developing countries were represented on the panel.

Attention was progressively focused on level one. A target date of January 1975 was set for the production of its first output, and an effort was launched to produce an experimental issue of *Agrindex* (the proposed printed output) to test the validity of the procedures and processing. But these procedures and the processing had not yet been defined in sufficient detail. To help meet the schedule, the FAO established an AGRIS Implementation Advisory Group to work with its own staff. I was to be the group's chairman, and the other members represented the organizations that were expected to be the major contributors of input at start-up. They included one person from a developing region, Dolores Malugani of the Instituto Interamericano de Ciencias Agricolas (IICA), as well as representatives of NAL, CAB, the European Communities, Czechoslovakia, and the U.S.S.R. Our first meeting was combined with the fourth meeting of the Panel of Experts in May 1972. However, my most enduring memory of the Implementation Advisory Group relates to its second meeting, which took place in Prague in September 1972.

As chairman, I reminded my colleagues that there were only two years and three months before the first regular issue of the output was due, and I called on them to identify the various tasks that had to be completed in order to make that possible. As these were identified and sequenced, I wrote them on a blackboard with a time allocation for each of the phases that had to be completed before the next could begin. When we included the development of software and the acquisition of computer equipment, it was obvious that we could not meet the target date.

Should we ask the FAO for a postponement, or should we seek to use software and computer resources available elsewhere? Resistance to both alternatives was strong, but something had to give. I asked my colleagues to allow me to make an informal approach to Brunenkant as director of the IAEA's STI division and find out whether he would be willing to process AGRIS input on IAEA facilities in Vienna, assuming the FAO and the IAEA could reach an appropriate agreement. Our last session was in the morning, and our flights out of Prague were to be around midday. At the last moment and quite grudgingly the Implementation Advisory Group gave its authorization. That night I was back in Ottawa, and the next morning I phoned Brunenkant. Having described what had happened in Prague, I put the question. What followed was the longest pause in any conversation I can remember. Finally Brunenkant broke the silence and said firmly, "Yes, John, I'll do it!"

The next call was to Aubrac. He made the formal approach to the IAEA, and since the cooperation was agreed in principle, plenty of time was left to work out the financial and staffing details. Helga Schmid, who had worked for INIS since early 1970, was transferred to the FAO staff in 1975 and later became head of the AGRIS Processing Unit hosted by the IAEA in Vienna. That arrangement lasted for more than twenty years, and by sharing resources both systems benefited technically and in terms of cost (Marchesi, 1984). It was a rare and outstanding example of true cooperation between two organizations in the U.N. family.

The decision to have AGRIS processed on INIS software was a great spur to convergence between the two systems. If, for example, the FAO had insisted on different rules for bibliographic description, this could have required changes in processing and checking routines and greatly increased the amount of work required before start-up. Nevertheless, the FAO still needed to accelerate the business of documenting the rules for inputting to AGRIS, and its success was demonstrated when the experimental issue of *Agrindex* came out in September 1973. This issue contained 6,659 records contributed by 12 countries and 17 institutions, and it had been processed in Vienna under the INIS system (Dubois, 1984, pp. 57–58).

The cooperation with INIS virtually confirmed the adoption of English as the "carrier language" for AGRIS computer processing, a decision that NAL had also made mandatory for securing its participation. Participating countries would thus be required to translate the titles of their documents if these were not already in English. Over the years this requirement imposed a burden that fell unfairly on some countries much more than others, and it seriously diminished the coverage of non-English literature. For example, as recently as the late 1990s Mexico was reporting only those of its documents for which the publishers had provided titles with English translations. The Mexican input center did not have the capacity to translate the titles of the many eligible documents published with Spanish-only titles. After AGRIS had been in operation for a few years and it had adopted indexing with descriptors from a multilingual thesaurus, I began to argue that it should accept without

translation any titles written in the Latin alphabet whether original or transliterated (Woolston, 1984b, pp. 137–139), but mine was a lonely voice.

As 1973 progressed, more and more countries committed themselves to participation, including the Soviet Union, which was not even a member of the FAO. Nevertheless, we in the IDRC were concerned that the system had been designed with very little participation from the developing countries. How would they react to what was being proposed? So the FAO and the IDRC agreed to cosponsor a meeting in Rome that would be composed entirely of agricultural information specialists from developing countries. It was timed to coincide with the appearance of the experimental issue of *Agrindex* and before the AGRIS system design was to be finalized at the end of 1973.

Mr. M. Moulik, who had formerly headed the information program at the FAO, came out of retirement in India to chair the meeting. The other eleven participants were persons with responsibility for agricultural information programs at various institutions in Africa, Asia, and Latin America. The group managed its own discussions, prepared its recommendations, and wrote its own report (International Development Research Centre, 1974).

Aubrac, Brunenkant, and I were present among the "observers," all of whom were pledged not to speak unless asked a direct question. The meeting was one of the most exciting I have ever attended. The participants deplored the then existing situation for developing countries (a plethora of different bibliographic services, overlapping but with many lacunae—and mostly unaffordable), but then they proceeded quickly to recommend "Emphasizing that AGRINDEX should not become simply an additional current bibliography; it is *recommended* that the essential characteristic of AGRIS Level 1 be its *comprehensiveness* in terms of subject matter coverage, geographic coverage, and inclusion of all types of unpublished and published literature" (International Development Research Centre, 1974, p. 8).

They went on to make concrete suggestions on the structure of AGRIS and its relation to regional and national organizations. They also stressed the importance of standards, training, and mechanisms to obtain access to primary literature, both the commercially published and the "nonconventional" or "gray" literature.

The meeting built momentum both in the FAO and in countries not previously involved. It was particularly encouraging for those of us at the IDRC who were recommending grants to help ensure that developing countries would participate from the very start of AGRIS in January 1975. At first we concentrated on those regional institutions that had been asked by their member countries to act on their behalf in collecting documents and preparing input to AGRIS: IICA in Turrialba (later San José), Costa Rica, and the Southeast Asia Regional Center for Graduate Studies and Research in Agriculture (SEARCA) in Los Baños, the Philippines. The IDRC also funded training courses, itinerant experts to visit national AGRIS centers and help sort out problems as they arose, and a team in Vienna to convert data from worksheets into machine-readable form on behalf of those developing countries not yet able to do so.

AGRIS began operation on schedule with a remarkable degree of participation from both rich and poor countries, as well as from East and West. Nevertheless, there were dark clouds on the horizon. In the years preceding start-up CAB had embarked on a program of modernization, involving collecting together the records produced by its various institutes, entering them in a common computer system, and generating an all-agriculture database that would be marketed throughout the world. Thus it was apparent that CAB and AGRIS would become competitors, although this was rarely admitted, and the relationship was often shrouded in hypocrisy. The governments that were members of CAB were also members of the FAO, and for a number of years some of these governments made arrangements with CAB to provide input to AGRIS on their behalf. Both organizations felt some obligation to "cooperate," but it was an uneasy relationship given that, if AGRIS succeeded in meeting the needs of a substantial number of users, that would diminish the market for CAB's main product. The FAO was making the AGRIS database available to all participating countries, and each of them could exploit it freely within its own territory. However, CAB was doing all its production within the high-salary environment of the United Kingdom and needed to recover its costs by setting what were, and still are, remarkably high prices for its products.

CAB had, and retains, an excellent reputation for the scientific quality of its work. It is selective, seeking to report the published material of enduring value, and there are many users prepared to pay for such a service. By contrast, AGRIS contains what the participating countries have decided to submit, including nonconventional or gray literature (technical reports) that may provide early indications of new practical developments

and details not found in journal articles. But between the CAB and AGRIS databases a considerable overlap in content would always exist, and as described in the last section of this paper, the competition was likely to be influenced by promotional and marketing strategies.

Another cloud that darkened the horizon involved NAL and the conditions it imposed for its own participation. John Sherrod had left his position while AGRIS was still being designed, and he was succeeded first by Joe Caponio as acting director and then by Richard Farley in July 1974. It seemed that both men were under a lot of pressure from the staff of NAL to maintain the status quo, and so they decided not to adopt the AGRIS rules for bibliographic description, even though the rules had been accepted by all the other participants. Well, you cannot have a global database without the information from a producer as dominant as the United States. So Helga Schmid developed programs to massage NAL records into AGRIS format, but they still did not have as much detail as records from other countries.

Even more serious was the concern about subject control. Many AGRIS participants, especially the Europeans, wanted the FAO to develop a multilingual thesaurus of descriptors to be used by all participants to index their records. However, NAL was opposed, pointing out that its staff members were not agricultural-subject specialists and could not be expected to acquire a sufficient scientific background and to use such a thesaurus effectively. For the start-up of AGRIS a compromise was negotiated: inputters would index, but only according to the "commodities" treated in each item. The relevant commodities were usually named in the title of the item; so the task involved little more than "enriching" titles where necessary, which was more or less consistent with NAL's existing practices.

Some time after AGRIS started, the issue came up again, and the FAO agreed to launch a project to produce a multilingual thesaurus called *AGROVOC* that could be used for indexing in AGRIS. Since the descriptors in different languages would be correlated, this held out the prospect of indexing in one language and retrieving in any of the others. The same Rudolf Brée who had worked with the IAEA in the production of the INIS thesaurus had been one of the original members of the AGRIS Panel of Experts. By this time he had retired, but his team, with Euratom itself, had been absorbed into the European Communities. Since the European Communities organization was acting as a regional participant within AGRIS and was one of the strongest promoters of the *AGROVOC* project, it was once again logical to base the work in Luxembourg. Donald Leatherdale of the IDRC was appointed as the project leader, and the IDRC recruited a Latin American specialist to work on the Spanish descriptors (this was before Spain's entry into the European Communities). Specialists from France and CAB were also members of the team.

We had no way of knowing whether NAL would accept and use *AGROVOC*. Unfortunately, it is in the very nature of this type of work to seek to avoid ambiguities by proposing descriptors at ever more specific levels ("narrower" terms below "broader" terms); I was worried that the more complicated *AGROVOC* became, the less likely NAL would accept it. So whenever I saw Leatherdale, I pleaded with him to "keep it small, keep it simple!" What we did not know was that CAB had an ongoing, in-house, undisclosed project to develop a very deep, but unilingual, thesaurus for use with its own database. Then soon after the *AGROVOC* work was completed and the team had been disbanded, CAB released its own product. This coincided with another change in direction at NAL; the new director, Joseph Howard, announced that, yes, his staff could do subject indexing after all—and that they would use the more profound CAB thesaurus! Once again Helga Schmid had to write special programs, this time to take CAB descriptors and convert them to *AGROVOC* equivalents, unfortunately with some inevitable loss of precision.

In subsequent years the FAO cooperated with NAL and CAB, as well as with French and Spanish specialists, to maintain *AGROVOC* and to ensure a maximum degree of compatibility with the CAB thesaurus. But a project to construct a *Universal Agricultural Thesaurus* foundered because of fundamental differences, both linguistic and commercial, between the needs of the two systems.

Another serious problem came from within the FAO itself and apparently is still not resolved after more than a quarter of a century. The FAO is a huge organization managing international programs, not only in agriculture but also in food and nutrition, forestry, and fisheries. It is said that back in 1970 the then director general had pronounced a *diktat* that the scope of AGRIS should cover "all the fields of responsibility of FAO" and that the first meeting of the Panel of Experts had obligingly endorsed this position. In any case the AGRIS coordinating team has adhered to it through the years. However, within the FAO, there is also a Fisheries Department, and even before AGRIS was proposed, it had

set up a consortium with prominent fishery research institutions to provide bibliographic input to the private company that produced *Aquatic Sciences and Fisheries Abstracts (ASFA)*. So while the FAO was inviting all its member states to contribute information, including fisheries information, to AGRIS, it was also inviting some of its larger member states to contribute fisheries information to *ASFA*. The details of the cooperation have changed over the years, but at least until recently the consortium has been maintained and there has been a business arrangement with the current producers of *ASFA*.

The AGRIS team has always insisted that it would work with only one center for each country. Each country had the absolute right to determine where that center would be located. In some countries a government department is responsible for both agriculture and fisheries, but in many countries the two sectors are managed separately. In practice it has proved very difficult for national AGRIS centers based in the agricultural sector to access the fisheries information as well. Many centers have simply not attempted to report fisheries information, and the resulting poor coverage has tended to compromise the credibility of the whole system.

I was in fairly frequent contact with the FAO on this issue until 1992, and I found it most frustrating to be faced with the same never-changing bureaucratic standoff. Top management seemed not to bother as long as the pretense was maintained that AGRIS was embracing all FAO interests. A solution should have been found: either the FAO could have declared that AGRIS was for the agricultural sector and that fisheries would be handled separately, or it could have extricated itself from the commitment to *ASFA* and allowed countries to nominate a second participating center to ensure a satisfactory coverage of fisheries within AGRIS. It did neither.

Unfortunately, I must also find fault with the FAO's concept of its relationship with the participating centers. This contrasted markedly with that of the IAEA, where the national INIS liaison officers have a considerable measure of control over the policies and operations of their system. However, the same formula might not have been practicable for AGRIS, where the number of participants has been double or triple the number in INIS.

After the eighth meeting of the AGRIS Panel of Experts in 1976 I recommended that, since the members did not represent the participants, it should be disbanded and replaced by a group that would be structured more democratically. I had in mind that the participants in each region might elect a person to represent them for, say, three years in a body that would meet at least once a year with the FAO staff. I also imagined that there would be meetings, perhaps every three years, of all participants in each region. The FAO did disband the panel but chose to replace it with "consultations" held approximately every three years with all participants who were able to obtain the means of getting to Rome. Many did, which made these gatherings huge, very intimidating for people who had little or no experience with the international environment. The FAO staff sat high on a dais above the participants on the floor of a great hall, and the chairman, whose election was usually arranged by the FAO staff, often had little experience with the role and was dependent on whispered advice. Both during and between these "consultations" the FAO's posture was needlessly "top-down,'" which gave the participants little sense of ownership of AGRIS.

I have detailed some of the problems, not to blame individuals after all these years but as a basis for drawing conclusions in the last section of this paper. In fact, despite the problems AGRIS forged ahead. Particularly in smaller countries it provided a new motivation and confidence among librarians and documentalists who had previously felt isolated. Many AGRIS inputters were quasi-volunteers who made the effort because they wanted to cooperate with their colleagues in other countries, even though they would not be remunerated for the extra work.

In 1974 Aubrac went on special assignment to the U.N. in New York; the direction of the FAO's AGRIS team was first taken over by Nicolae St. Dumitrescu from Romania and several years later by Emile Samaha from Lebanon. Both directors maintained a strong commitment to the system and made special efforts to assist the participants in poorer countries: they organized training for hundreds of individuals and, for example, were often able to secure donor-funded technical assistance for the participating institutions (Portegies-Zwart & Samaha, 1993; Menou, 2004). In 1980 the FAO responded to the wishes of many participants and began accepting abstracts for inclusion in the database. Then from 1982 to 1986 *AGROVOC* indexing was phased in, allowing users to interrogate the system in any one of three languages—English, French, or Spanish (Lebowitz, Portegies-Zwart, & Schmid, 1991). NAL's *Bibliography of Agriculture* had been replaced by an electronic service, *Agricola,* and most of its items of U.S. origin

were contributed to AGRIS. NAL was also progressively scaling down its coverage of non-U.S. items as AGRIS was building up its own; so for some years we were on track toward Sherrod's original goal.

New ways were found to exploit the database. Some participants downloaded records on particular topics and published periodic bibliographies; being participants, they were free to do this without paying royalties. Egypt was one of the countries that produced a regular national agricultural bibliography by downloading from AGRIS; the output included not only the records contributed by Egypt but also those from other countries if the subject concerned Egypt or if the author worked at an Egyptian institution. When the CD-ROM technology arrived, Samaha responded quickly: every participating center was given the entire database with periodic updates, and it also became available in many other institutions, including institutions in developing countries for which Samaha had negotiated preferential tariffs.

* * *

Now I must return to the question of "level two." In 1975, after Scrivenor had retired, the FAO reconstructed the Panel of Experts; I was made chairman, and at last we had significant representation from developing countries. As previously mentioned, the FAO had hosted a series of studies in response to suggestions made by existing services, usually involving CAB and other institutions in Western Europe, especially France and the Netherlands. Each study related to a broad swathe of topics within the subject scope of AGRIS, such as "forestry" and "tropical agriculture," and it enabled the existing services to explore how they might cooperate with each other. Nevertheless, the products they envisioned were still predominantly bibliographic. As compared with level one, more judgment would be exercised at level two to select items of enduring value, the indexing would be deeper, and abstracts would be added. Since many of us were anticipating that deeper indexing and abstracts would likely be added to level one, these level-two proposals seemed to offer only marginal improvements and would still result in high-cost products. At the last meeting of the Panel of Experts in May 1976 we considered a proposal for an "AGRIS Tropical" system, and while we encouraged the existing services to continue their search for ways to cooperate, we decided not to recommend that the FAO be responsible for setting up the proposed system (Woolston, 1977).

However, at the IDRC we had clearly accepted that a giant bibliographic system such as AGRIS could not meet all the information needs in the agricultural sector. Users also wanted data; news; advisory services; directory-type information on persons, institutions, programs, and projects; and both the analysis and synthesis of published information. So if there was going to be a level two, it should do much more than provide a better bibliographic service. Further, any effort to broaden the range of services should be linked to a sharp focus on a specific subject, since no set of providers could be experts on many different topics. This brought us back to the Weinberg Report, which includes two often-quoted pages on "specialized information centers" (President's Science Advisory Committee, 1963, pp. 32–33). In a forthright but controversial statement the authors advocated that any such center should not be set up in a library but rather that it should be staffed by scientists and be located within an eminent research team already focused on the subject. In that environment staff members could be involved in both the analysis and synthesis of information, and they would have access to the knowledge and experience that would enable them to evaluate information and data, make qualitative judgments, and offer authoritative advice. For any given specialized subject we can speak of an "invisible college" of individuals who—in order to serve their common interests—communicate by e-mail and telephone, exchange reprints of their publications, visit each other's laboratories, and meet at the relevant conferences. An information center on the Weinberg model could become a major resource for the "invisible college," perhaps even its headquarters, and be an engine for progress in its field.

The IDRC was able to help fund some specialized information centers, more or less according to the Weinberg model, at research institutions in developing countries on particular crops (e.g., cassava, coconuts, and sorghum and millets) and on a particular agricultural practice (irrigation). In the paper already referenced (Woolston, 1977), I offered the IDRC's full cooperation if the FAO would set up a consultative mechanism, involving donors and scientists, to identify priority topics for new centers and to seek appropriate funding. My offer was not taken up, and I must admit that the early vigor of most of the IDRC-funded specialized centers was diluted with time; they tended to be absorbed into the libraries of their host institutions, and the scientists drifted away.

Economic and Social Development – DEVSIS

Since DEVSIS was never launched on a global scale, this story will be briefer than those for INIS and AGRIS. However, even before the IDRC came into existence, many agencies knew that their efforts to improve conditions in developing countries were impeded by a lack of organized information, and the deficiency had been highlighted in a landmark report by Sir Robert Jackson for the United Nations (1969, vol. 2, pp. 215–278). The evidence was overwhelming that ignorance of what had already been done was leading to unacceptable levels of waste and duplication. But relevant information was being recorded by a host of agencies, some in the developing countries themselves, for example, the Ministries of Planning. The other producers included various U.N. bodies and the development banks, the "aid" agencies of richer countries, the many benevolent nongovernmental organizations, and the academics who carried out surveys and research. Most of the resulting documents were not commercially published, and as gray literature they were usually printed in small quantities and failed to be noticed by the discipline-oriented systems. If ever there had been a case for a cooperative mission-oriented system, here it was!

Since the IDRC was a new organization, we first needed to make contact with those who already had experience in managing information about development issues. Various agencies were producing bibliographic services to cover particular facets of the overall mission. They had found that they needed to separate the overarching issues of development in general from the often more technical issues related to development in individual sectors. Jean Viet, working with the Development Center of the OECD (Organization for Economic Cooperation and Development), had suggested how this could be done; so one of the IDRC's first grants was to enable him to produce a multilingual *Macrothesaurus* for any mission-oriented system on the overarching issues, while incorporating terms to ensure connection and compatibility with thesauri for systems in particular sectors.

Within the IDRC we also realized that if we were going to work with other organizations and with poor countries to build information systems on economic and social development, we should begin acquiring experience of our own. Fortunately, we were going to build a new library in Ottawa—one unconstrained by existing practices—and we saw that this could be a laboratory for testing methods of cataloging, indexing, and computer processing. Arthur and Marianne Vespry, our first librarians, were enthusiastic, and we knew that we would need to take account of emerging international standards and employ the most appropriate software and hardware so long as it was available for use anywhere in the world. We developed relations with Adam Wysocki from Poland, who was heading UNESCO's UNISIST program and encouraging the adoption of standards and compatible practices for all scientific and technical information systems. And after evaluating various other bibliographic systems, we recognized the preeminence of the ISIS package for library management and information retrieval, which had been developed by the International Labour Office in Geneva. In those years (early 1970s) ISIS needed a big IBM mainframe computer, and for this we bought time in a service bureau. The International Labour Office licensed us to use its software, and it also signed an agreement allowing us to introduce ISIS to developing countries and to provide them with training and support services.

As the IDRC took on staff members (program officers and computer specialists), and as these traveled to international organizations and to developing countries, we were gradually acquiring the knowledge and contacts that would enable us to offer proposals for common action. As director of the IDRC's Information Sciences Division, I made special efforts to find out how "development" information was handled in developing countries and to discuss their needs with key individuals in the U.N. organizations. By late 1973 and after full discussion with the IDRC's president and governors I felt ready to launch an initiative proposing more effective international cooperation in the handling of development information. A concept paper was widely distributed in January 1974 (Woolston, 1974). The response was remarkably positive, and six months later the IDRC was joined by the OECD and UNESCO in convening a large meeting in Ottawa of the interested parties. Aubrac chaired the meeting in his personal capacity.

The Ottawa meeting endorsed the name "DEVSIS" for a mission-oriented system that would attempt to organize information on the issues of economic and social development. It called for the establishment of a steering committee to oversee the work of a study team. UNESCO became the convener of the steering committee; Paul-Marc Henry, president of the OECD Development Center, was named as its chairman. At the request of the steering committee, the IDRC released

me to be director of the study team. The IDRC also assigned Kate Wild, who had previously worked at the OECD Development Center and with Jean Viet on the *Macrothesaurus*; she had also been our key person in establishing the ISIS facility, which was now processing the IDRC's library records.

The International Labour Office, having recently occupied its new building in Geneva, offered to make space and facilities available for the study team and to assign George Thompson, its chief librarian, to prepare for the arrival of the team and to be its deputy director. We began work in March 1975 and continued through September. Full details of the membership of the steering committee and study team are given in a final report (DEVSIS Study Team, 1976), which was published on behalf of the six cosponsors: the IDRC, the International Labour Office, the OECD, the U.N. Department of Economic and Social Affairs, the U.N. Development Programme (UNDP), and UNESCO.

The final report goes into extensive detail describing a system with two files, the first bibliographic and the second to facilitate "referrals" to other established sources of information. Much of the detail was based on the INIS-AGRIS experience and, for the first file, on the concept of decentralized input paralleling the INIS-AGRIS territorial formula. DEVSIS would seek to be consistent with the objectives of the UNISIST program and thus become compatible with INIS and AGRIS and other sectoral systems that might be developed in the future. We sought a home for the central DEVSIS office in a U.N. organization, and our preferred option involved locating the processing work with INIS and AGRIS in Vienna. Incidentally, the Vienna International Center was then under construction, and it was to become the headquarters for the IAEA and all other U.N. bodies in that city; they were to share a common library and computer and printing facilities, and I was not the only person who was dreaming that the Vienna International Center would eventually have the equipment and staff to run a full-scale processing operation for a growing number of international mission-oriented information systems.

How to fund DEVSIS? This was to become the determining factor. It had not been much of an issue for INIS and AGRIS: the costs of their central operations were borne on the regular budgets of the IAEA and the FAO, respectively. But there was no single U.N. agency with overall reponsibility for economic and social development, and the study team had estimated a total of $1.6 to $2 million to cover the central costs of DEVSIS operations for the first three years. Louis Shapiro, a Canadian, who was director of management information services at UNDP, was also a member of the DEVSIS steering committee. As early as 1974 he had sketched in a notional figure for a UNDP "Global Project," which was the steering committee's preferred option for financing DEVSIS for the initial period. Unfortunately, 1975 was the year when the UNDP encountered a financial crisis. The world economy was entering a period of inflation after a long period of general stability, and the costs of field operations funded by the UNDP were far exceeding budget expectations. So the agency was forced to forgo new commitments. Of course the same inflationary trend was affecting all cosponsoring agencies, and the steering committee was not able to identify an alternative source of funds.

This was a sad outcome for the many people who had invested a lot of time and energy in what they believed was a much-needed system. Some relatively small DEVSIS-type operations were established: in the U.N. Department of Economic and Social Affairs in New York City; in the U.N. Economic Commissions for Africa and Latin America (with a branch operation in the Caribbean); and at the IDRC (for the Canadian material). However, there was no coming together of these operations nor any involvement of the big information producers, such as the World Bank and the development-aid organizations in richer countries.

A Summing Up

Thirty years ago we still looked mainly to governments to manage major programs in applied science, and when these programs involved international coordination, we would rely on the intergovernmental agencies created for just this purpose. Thus throughout the 1970s and into the 1980s I was a convinced advocate of the INIS-AGRIS model for mission-oriented information systems (Woolston, 1984a). I was accepting invitations to write articles and speak at conferences, and I would try to explain how such systems would be more efficient than the traditional models and would save unnecessary work for people all over the world: how, by recording information in the country where it was produced, it would be entered in the database more quickly and without waiting for documents to be ordered and transported to a central location; how a (nearly) comprehensive service in a given sector would obviate the need to search through several partially complete services, as well as avoiding the cost of obtaining them; and how, once standards had been adopted by consensus among the participants, the same document would no longer require

cataloging in all the libraries that acquired it—now they could simply download the standard record from the international system. To give an actual example of this last point, the institute with which I am currently associated has a computerized library catalog of almost forty thousand records, a quarter of which were taken directly from AGRIS, and this proportion could have been significantly higher if the practice had begun sooner.

Above all, the INIS-AGRIS formula gives each country the possibility to participate. Through its representation in the international agency each country can have a voice in the policies governing the system, and by taking responsibility to report its own national literature, it makes the ultimate decision on what to enter and what to leave out. It has a piece of the action.

In the 1970s there was considerable concern for the relative disadvantages suffered by the poorer countries, many of them newly independent, only recently released from colonialism. Resolutions of the United Nations called for a "new international economic order," and within such statements were demands for "the sharing of knowledge on the basis of equity." I would try to explain how the INIS-AGRIS model provided for just such equity. Each country was required to contribute only the information produced in its own territory (hence in proportion to the extent of its activities within the scope of the system). Each country would take from the system whatever it could use (and hence again likely to be in proportion to the extent of these activities). So big countries would contribute a lot, but use a lot; little countries would contribute a little and use a little: is that not "equity"? At one meeting Lee Burchinall—not unkindly—described this as "John Woolston's quaint Marxism," and as long as he retained the adjective, I had no reason to quarrel with his verdict.

But was I naive in believing that the world would be willing to cooperate to this degree? If in any sector all the big countries and many small countries participate, then a system will be credible and viable. But if countries opt out, for political reasons or to protect powerful commercial interests, then the system will lack a sufficient degree of comprehensiveness and lose its credibility. Further, an international agency responds to the demands of its member countries, particularly as they are voiced in the agency's governing body. If national representatives speak up in favor of a system, the agency will give it attention and an appropriate share of resources, but if little is said, then the agency is likely to squeeze the information system when it comes time to divide a budget for which many other programs are competing. Moreover, let us not be blind to the fact that librarians and documentalists are rarely in the foreground of attention for the politicians who determine priorities in both national and international affairs.

So what has happened in the world at large since those glorious days in the late 1960s and early 1970s, when we could put men on the Moon and everything seemed possible? Then it was reasonable to ask for action in the public sector to achieve important objectives; now we shrug and say "let the market decide." We believe that if there are enough people wanting a particular type of information, either it is already on the Internet or it soon will be. Of course, there's the rub: what happens to the needs of the people who do not have enough power in the market to ensure they will be supplied? Do governments still have a responsibility to ensure that development—scientific and technical, economic and social—is not impeded by lack of access to the relevant information?

Let us look at what has happened to INIS and AGRIS in this new age of market-based competition. Figure 1 shows the annual rate of additions to the two databases. INIS reached a peak in 1988 (106,680 new records); this achievement was followed by a slow decline that was probably inevitable given that nuclear power was becoming an increasingly mature technology and new investments had fallen sharply after the Chernobyl catastrophe. But AGRIS continued to grow to a peak in 1996 (170,284 new records); since then, however, it has been in disastrous decline—which cannot be explained by any lack of interest in the production of food!

AGRIS had been the FAO's flagship information program; it demonstrated a very unusual working partnership between an international agency and almost all its member states, constructing a database that was distributed on CD-ROM and used throughout the world. For some years AGRIS had been the world's fastest-growing bibliographic database in agriculture. What happened?

The decline in activity corresponds to the time when several senior FAO staff members retired. Some of these individuals had worked tirelessly for AGRIS for two decades or more. They knew their partners in the participating countries and engaged them in frequent exchanges about the day-to-day functioning of the system. The new people who were recruited to take their places had new ideas and probably saw AGRIS as an outdated concept. Now the priority was to be an Internet service with the FAO as the source.

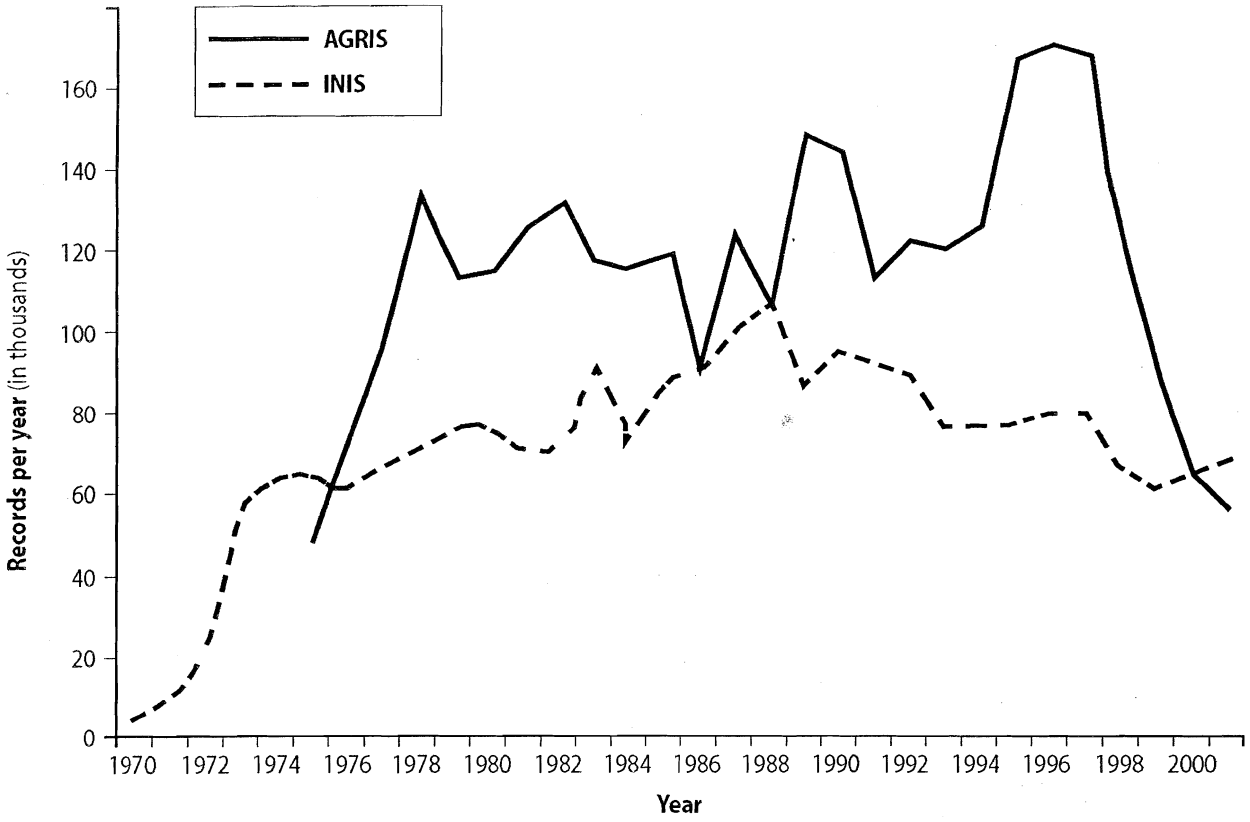

Figure 1. *Annual increments to the databases in numbers of new records: INIS (1970–2001) and AGRIS (1975–2001).*

Communications with the AGRIS partners dried up: the big "consultations" were postponed; the processing of AGRIS records was transferred from Vienna to Rome with a further loss of experience and staff; the CD-ROM products fell behind schedule. Many of the AGRIS partners were sending e-mails to Rome and to each other, first asking what was happening and then protesting. But gradually they gave up: without encouragement from the FAO many just stopped sending input. And the commercial competitors were not asleep. Seeing the decline, they were ready to tell potential clients that AGRIS was dying and that they should look elsewhere for their bibliographic services. The steep decline shown in Figure 1 was the inevitable result.

Of course, this might have been avoided if the participants in AGRIS had been able to talk to their diplomatic representatives and persuade them to make a case at the FAO for continuing a program that had proved so effective over the years. Ultimately, it is the countries that have the right to determine the programs of the international agencies. They should have been making the decisions about an issue as important as the future of AGRIS.

* * *

In this final section let us try to look at the prospects for broad-based bibliographic services in the future. The international cooperative systems obviously have their fragilities and inefficiencies. But so do the alternatives. The centralized commercial systems, such as *CAB Abstracts* or *Current Contents,* can maintain high levels of consistency and scientific rigor, but they are very expensive and unaffordable for many potential users. The Internet is a magnificent achievement, a marvelously accessible source of every kind of information, yet it is wasteful to the extent that different providers are covering the same ground but leaving significant gaps. Perhaps within the next couple of decades the ideological pendulum will swing back, and people will ask whether they have had enough of competition and whether there is more to gain through cooperation. If so, what are the lessons from the past?

Define scope realistically. In setting up a cooperative information system, one is seeking to serve a community of institutions engaged in the same mission. One should know which institutions are to be involved and

delimit the scope of the system to the interests they have in common. That was easy for INIS: most countries had established a single powerful institution to look after atomic energy. Those institutions already knew each other and had met in the IAEA. Together they argued over the scope of INIS and implemented it in stages. For AGRIS the issue was much more difficult because the scope was huge and most countries had several or many institutions responsible for agricultural research and development. When one of these was chosen as the participant in AGRIS, it really needed to organize, at least informally, a national mini-AGRIS to engage all relevant information producers and thus cover the various facets of the total scope. And as most countries have a separate set of institutions for fisheries, this sector should have been offered its own separate system.

The DEVSIS study was also hampered by the great number and variety of institutions involved in the mission of social and economic development, in this case at the international as well as at the national level. There was, and there still is, a pressing need for something like DEVSIS, and it is unlikely ever to attract the interest of commercial providers. So perhaps the question should now be revisited at the highest intergovernmental level. However, careful attention would need to be given to the definition of scope so that the system would not become a basket for anything and everything.

Be prepared for competition. Competition was not a problem for INIS: the AEC fulfilled its own objective by abandoning *NSA* when INIS was in full operation. But the situation was quite different for AGRIS, and the competition from *CAB Abstracts* has always been a threat to its survival. The members of CAB International are the governments of Commonwealth countries, plus a few others, and the institution enjoys enough income so that it can invite top governmental agricultural scientists and officials to London, often on an annual basis. It is perhaps not surprising that many of these become partisan and, on returning home, show ambivalence or even hostility to their countries' participation in AGRIS. Also CAB International is able to advertise its products, and, for example, it exhibits at agricultural conferences and offers seminars for students in colleges and universities. Unfortunately, the FAO has never had the resources to act in like manner. Its slim budget for AGRIS was often a target when economies were needed, and the national participants were rarely in a position to promote the system within their own countries.

However, competition was not a reason for the failure of DEVSIS. Although there were many bibliographic services dealing with different aspects of social and economic development, there was a general willingness to see these subsumed within DEVSIS if it could be brought into operation.

Be sure of political support. As previously explained, INIS enjoyed universal political support, not so much because of what it would do but because it was seen as a potential relief to cold war tensions. Once established and with the liaison officers reporting positively to their respective governments, INIS has been maintained as a long-term component of the IAEA's program. However, political support for AGRIS has been intermittent and never really strong. After John Sherrod left NAL, AGRIS lost one of its most persuasive advocates, and his successors have so far not demonstrated a similar conviction. If AGRIS is to be resuscitated, it will probably require a new commitment by NAL, as well as an effort by the U.S. Departments of Agriculture and State to rally the countries that support AGRIS and to take concerted action requiring the FAO to remobilize the program.

There are also political lessons to be learned from the DEVSIS experience. We thought we had a lot of support, and on the cover of the study team's report we named the IDRC and the five intergovernmental organizations that cosponsored the work. But in reality it was the secretariats of those organizations that were engaged in the project, and when it comes to setting up new programs or spending money, secretariats need the authorization of their member governments. We had done very little to mobilize the national governments, which was our big mistake. Of course, perhaps the national governments would not have wanted a system such as DEVSIS, which would have made it much easier for each to find out about the programs of the others and what all of them had done in the past. This may be cynical, but it is easier for a program officer to defend a project if it appears to be innovative and if relevant previous work has disappeared from view. However, only a few national governments, either in rich or poor countries, were aware of what was being proposed.

Provide democratic mechanisms for policy formulation and oversight. As indicated previously, the meetings of INIS liaison officers have been very influential in determining future directions for the system, and the lack of such a body has been detrimental for AGRIS. If the AGRIS participants had had a stronger voice in policy formulation and the management of their system, the decline in participation in recent years might have been arrested before it became precipitous.

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Many generous persons have helped me in the preparation of this paper. If I start to name them, where shall I stop? They know who they are, and I thank them all. However, I was invited to tell this story of the past to give some substance to my recommendations for the future. I could do so only if I was ready, not just to praise what proved to be successful but also to criticize those actions and policies that were obstructive or unproductive. So I am declaring here that the views expressed are entirely my own; they cannot be ascribed to individuals who helped me nor to any of the institutions with which I have been associated in the last half-century.

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References

Aubrac, R. (1996). *Où la mémoire s'attarde* [Where memory lingers]. Paris: Éditions Odile Jacob.

DEVSIS Study Team. (1976). *DEVSIS: The preliminary design of an international information system for the development sciences.* Ottawa: IDRC.

Dubois, G. (1984). Bref historique du développement technique d'AGRIS [Brief history of the technical development of AGRIS]. In *AGRIS and international cooperation for the exchange of scientific information: Proceedings of the tenth anniversary seminar, Rome, June 1984* (pp. 52–63). Rome: FAO.

East, H. (coordinator). (1971). *AGRIS Study Team report* (DC/AGRIS 2). Rome: FAO.

Fischer, D. (1997). *History of the International Atomic Energy Agency: The first forty years.* Vienna: International Atomic Energy Agency (IAEA).

International Development Research Centre. (1974). *AGRIS and the developing countries: Recommendations of the FAO/IDRC meeting held in Rome, 26–28 September 1973* (IDRC-025e,f,s). Ottawa: International Development Research Centre (IDRC).

Jackson, R. G. A. (1969). *A study of the capacity of the United Nations development system* (DP/5; 2 vols). Geneva: United Nations.

Lebowitz, A. I., Portegies-Zwart, R., & Schmid, H. (1991). Multilingual indexing and retrieval in bibliographic information systems: The AGRIS experience. *Quarterly Bulletin IAALD, 36,* 187–192.

Marchesi, I. (1984). INIS/AGRIS cooperation and its resulting benefits to both systems. In *AGRIS and international cooperation for the exchange of scientific information: Proceedings of the tenth anniversary seminar, Rome, June 1984* (pp. 120–124). Rome: FAO.

Menou, M. J. (2004). The FAO and the building of national agricultural information and documentation systems from 1966 to 1988. In W. B. Rayward & M. E. Bowden (Eds.), *Proceedings of the 2002 Conference on the History and Heritage of Scientific and Technical Information Systems* (pp. 391–408). Medford, NJ: Information Today.

Portegies-Zwart, R., & Samaha, E. K. (1993). FAO's contribution to a better flow of scientific information for agricultural research in small countries. *Quarterly Bulletin IAALD, 38,* 147–151.

President's Science Advisory Committee. (1963). *Science, government and information: The responsibilities of the technical community and the government in the transfer of information* [the Weinberg Report]. Washington, DC: U.S. Government Printing Office.

Shannon, R. L. (1970). Nuclear Science Abstracts: A 21-year perspective. In *Handling of nuclear information: Proceedings of a symposium, Vienna, 16–20 February 1970* (pp. 379–384). Vienna: International Atomic Energy Agency (IAEA).

Sherrod, J. (1984). A brief history of the conceptual phase of the AGRIS development. In *AGRIS and international cooperation for the exchange of scientific information: Proceedings of the tenth anniversary seminar, Rome, June 1984* (pp. 46–50). Rome: FAO.

Vaden, W. M. (1992). *The Oak Ridge Technical Information Center: A trailblazer in federal documentation* (DOE/OSTI-11673). Oak Ridge, TN: U.S. Department of Energy, Office of Scientific and Technical Information. Also available: http://www.osti.gov/ostihist.html.

Woolston, J. E. (1969). The International Nuclear Information System (INIS). *Unesco Bulletin for Libraries, 23,* 135–138, 147.

Woolston, J. E. (1974). *DEVSIS: A development science information system* (IDRC-doc-041). Ottawa: International Development Research Centre (IDRC).

Woolston, J. E. (1977). AGRIS Tropical: An alternative strategy. *Quarterly Bulletin IAALD, 22,* 30–34.

Woolston, J. E. (1984a). Information exchange in a North-South context: Is there more to gain through cooperation than in trying to establish new markets? *Aslib Proceedings, 36*(1), 7–14.

Woolston, J. E. (1984b). New technologies and the future development of AGRIS. In *AGRIS and international cooperation for the exchange of scientific information: Proceedings of the tenth anniversary seminar, Rome, June 1984* (pp. 134–141). Rome: FAO.

Woolston, J. E., Issaev, L. L., Ivanov, M. V., & Del Bigio, G. (1970). The design and implementation of an International Nuclear Information System. In *Handling of nuclear information: Proceedings of a symposium, Vienna, 16–20 February 1970* (pp. 607–619). Vienna: International Atomic Energy Agency (IAEA).